

(12) UK Patent Application (19) GB (11) 2 226 233 (13) A

(43) Date of A publication 27.05.1990

(21) Application No. 8830006.6

(22) Date of filing 22.12.1988

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(51) INT CL⁶
A47L 15/44, D06F 39/02

(52) UK CL (Edition K)
A4F F29A2E1
D1A ADKA

(56) Documents cited
GB 2647753 A

(58) Field of search
UK CL (Edition J): A4F, B1Q
INT CL⁴ A47L, B08B, D06F

(54) Dispenser

(57) A dispenser (1) delivering an aqueous chemical solution having a substantially constant concentration comprises a container (2) for holding and supporting a solid block (3), at least the lower part of which comprises a water-permeable support (4), a housing (5) surrounding the container and being openable at the top, downwardly directed fluid jets (6) mounted inside the housing adjacent at least two sides of the container and arranged to spray the lower parts of at least two opposed lateral surfaces of the solid block through the water-permeable support and an outlet (7) in the bottom of the housing for the aqueous chemical solution formed by spraying the block. The block may comprise an alkaline and/or surfactant composition and the solution may be used in an industrial cleaning process e.g. fabric washing or warewashing.

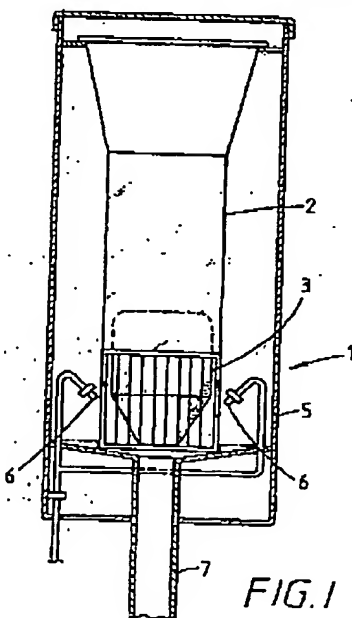


FIG. 1

At least one drawing originally filed was Informal and the print reproduced here is taken from a later filed formal copy.

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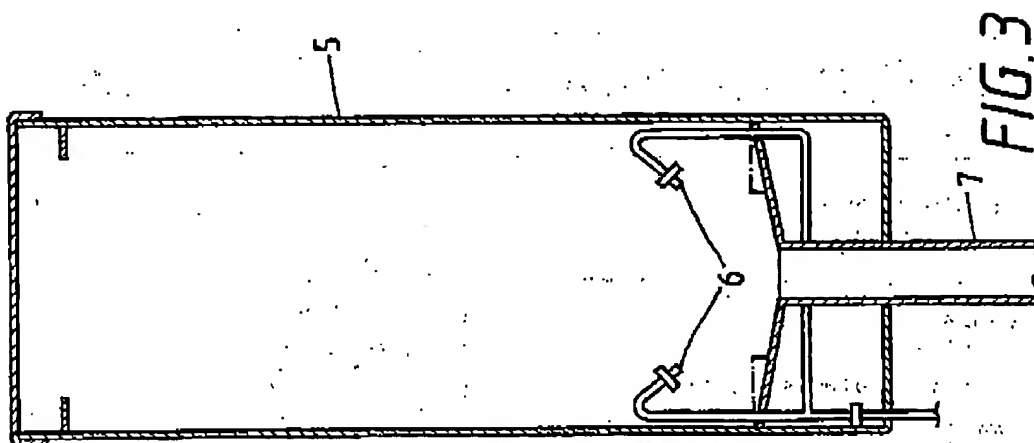


FIG. 3

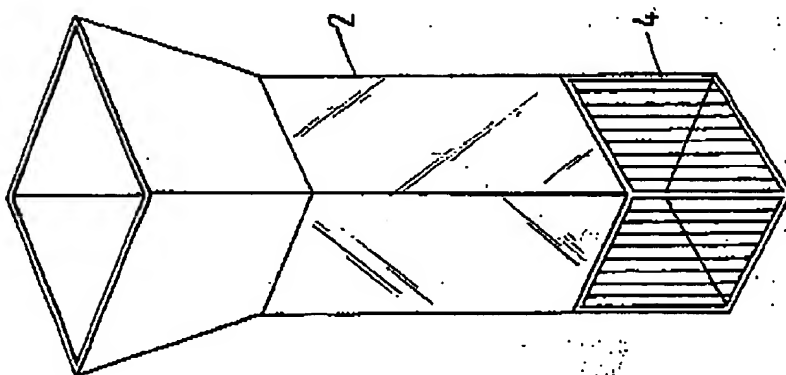


FIG. 2

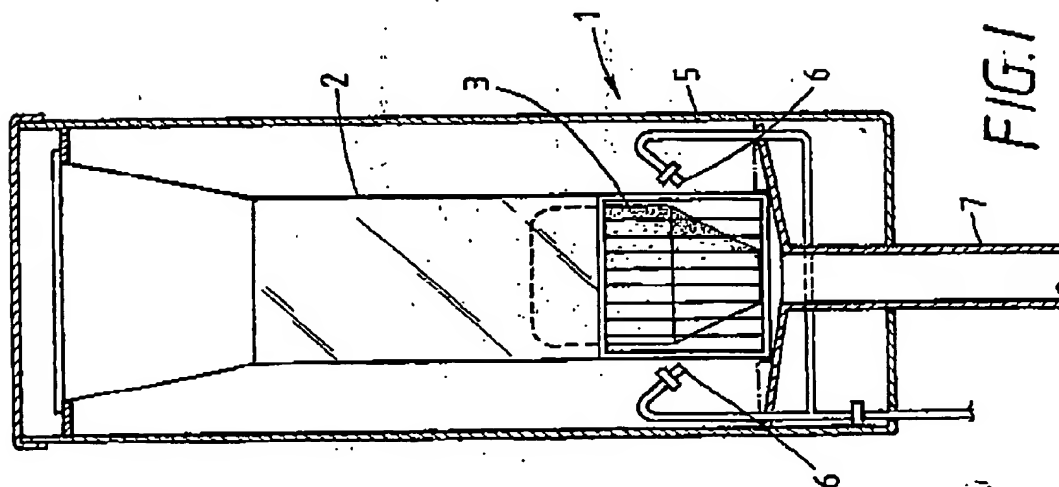


FIG. 1

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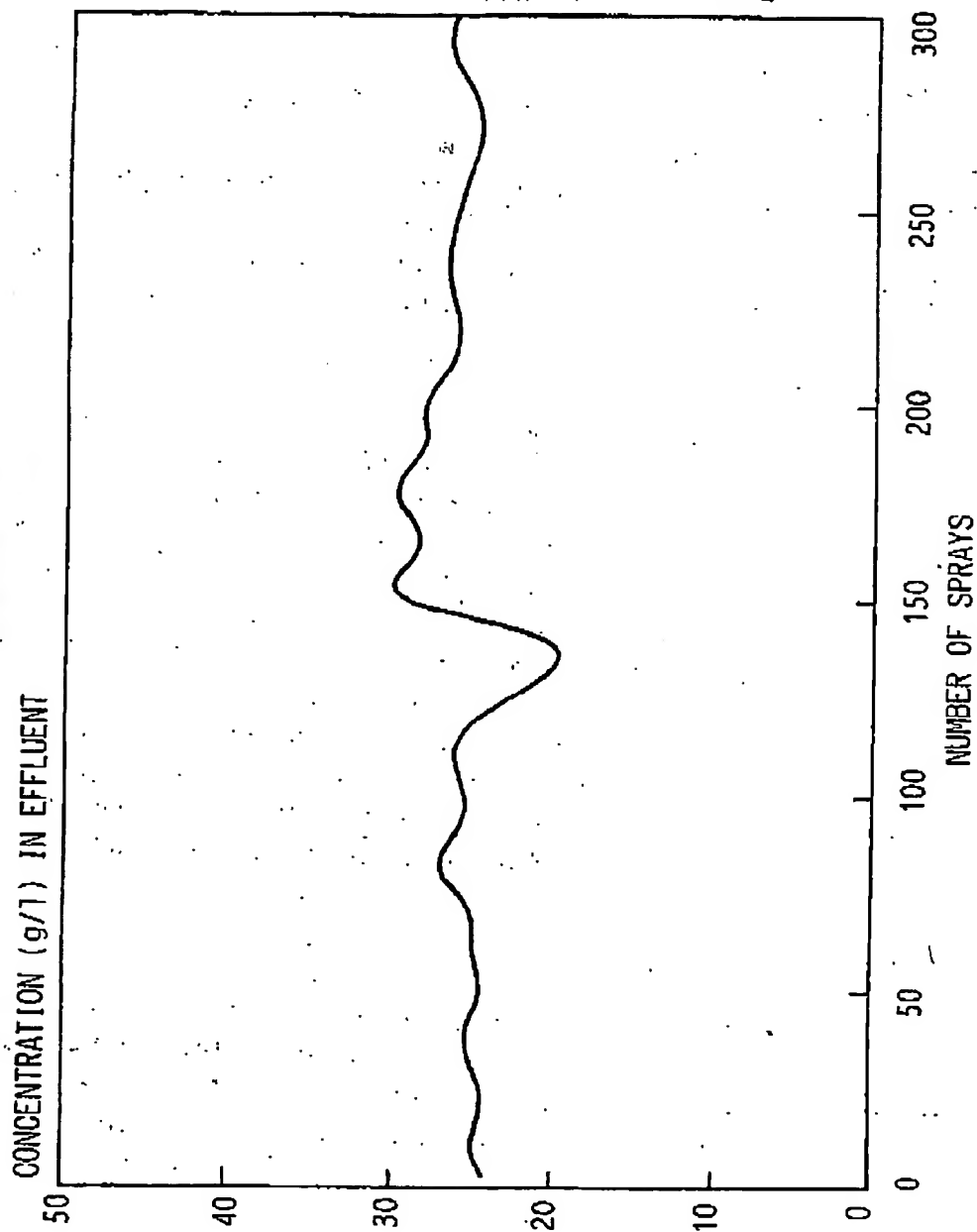
RATE OF SOLUTION OF CRYSTALIZED BLOCK

FIG.4

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DISPENSERTECHNICAL FIELD

The present invention relates to a dispenser for obtaining an aqueous chemical solution having a substantially constant concentration from a solid block of chemical. Such blocks of chemical are used in industrial cleaning processes such as fabric washing and warewashing, and generally comprise alkaline agents, detergents, builders, etc.

BACKGROUND OF THE INVENTION

Industrial warewashing machines generally comprise a wash tank which contains the cleaning solution for the wash process. In this process, the wash load is doused with the cleaning solution and subsequently with rinse water which falls into the wash tank. Each cycle, the cleaning power of the cleaning liquid is reduced, first because some is exhausted by the soil-removing process and, second, because it is diluted with rinse water. The cleaning solution is therefore recharged from time to time by adding fresh cleaning liquid from a dispenser system, which usually provides a concentrated aqueous solution of an alkaline- and/or surfactant-based chemical composition.

A number of techniques are known for converting the solid chemicals into a concentrated solution, dependent on the solid. For example, according to US-A-2,371,720 a solid powdered chemical can be dissolved by placing it on a sieve and spraying water on to said sieve from below.

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Alternatively, the powdered material can be dissolved in a dispenser of the "water-in-reservoir" type. In this type of dispenser, the powdered material is submerged under water, which therefore becomes loaded or even saturated with the powder. When more water is added, the excess solution flows into an overflow pipe leading to the washing machine.

It is also possible to use solid detergent materials in the form of briquettes such as, for instance, described in US patents 2,382,163, 2,382,164 and 2,382,165. Briquettes can be used in a "water-in-reservoir" type of dispenser.

A more recent type of solid detergent is the cast or block form, whereby a solid detergent block is formed by pouring a concentrated aqueous slurry into a container, in which it solidifies upon cooling as a result of the hydration of the salts in the composition, especially sodium tripolyphosphate. Such cast solid blocks are, for example, described in European patent 3,769.

These solid blocks cast in containers require dispensing systems whereby solvent is sprayed on to the block while it is inside the container, thereby dissolving the exposed surface to form a concentrated solution. Such a dispenser system is, for instance, described in European patent application 244,153.

When the solid blocks are not used in the same container in which they were cast, a wider choice of dispensing systems can be made. In principle, systems could be used as mentioned above for powdered solids as well as dispensers of the "water-in-reservoir" type. European patent application 231,603 discloses a dispenser

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comprising a three-dimensional screen on which a solid detergent block is supported, and spray means to impinge upon the solid block through the screen from below. We have now found that a simple, safe and reliable dispenser can be provided by the dispenser according to the present invention. This dispenser is furthermore easy to open for servicing and it provides a constant delivery of the chemical from the solid block.

10 DEFINITION OF THE INVENTION

According to the invention there is provided a dispenser for obtaining an aqueous chemical solution having a substantially constant concentration from a solid block of chemical, said dispenser comprising

15 (a) a container for holding and supporting the solid block, at least the lower part of which comprises a water-permeable support;

(b) a housing surrounding the container for the solid block, said housing being openable at the top;

20 (c) substantially downwardly directed fluid jets mounted inside the housing on at least two sides of the container for the solid block, arranged to evenly shower the lower part of at least two opposed lateral surfaces of the solid block through the water-permeable support;

25 and

(d) an outlet in the bottom of the housing for the aqueous chemical solution formed upon spraying water on to said block.

30 Preferably, the dispenser comprises a plurality of downwardly directed fluid jets arranged to impinge on to the solid block along a horizontal line, preferably along its entire width.

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DETAILED DESCRIPTION OF THE INVENTION

The invention will now be further explained by means of the following non-limiting specific descriptions, in which :

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Fig. 1 illustrates a dispenser according to the present invention including a solid block of chemical;

Fig. 2 illustrates the container for holding and supporting the solid block of chemical;

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Fig. 3 illustrates the housing surrounding the container depicted in Fig. 2.

Fig. 4 illustrates the operation of the dispenser in obtaining a solution of constant concentration from a solid block of chemical.

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Fig. 1 shows a dispenser 1 comprising a container 2 inside a housing 5, the container holding a solid block of chemical 3. The lower part of the container 2 comprises a cage-like structure which exposes part of the surface of the solid block. Alternatively, the lower part of the container may also comprise a sieve on to which the block of chemical is supported. At both sides of the container 2 there are provided fluid jets 6 which are downwardly directed towards the solid block. The water from the fluid jets 6 impinges upon the block and an aqueous solution of the chemical is formed. Depending on the nature of the solid block, the water may also form a slurry or suspension of the chemical. For the purpose of this invention, all these possibilities shall be referred to hereafter as aqueous chemical solution. As the block gradually dissolves, it takes the shape of a wedge. Further erosion of the block does not significantly alter the shape of the block any further, except that its height continually decreases. Its exposed surface, however, remains essentially constant.

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As a consequence, the aqueous chemical solution has a substantially constant concentration.

As the block of chemical is gradually dissolved, it moves downward inside the container under the influence of gravity. Several blocks may be stacked on top of each other in the container. The unused blocks then function as a reserve, which obviates the need of frequent refilling.

It was found to be very advantageous if there is provided a transparent part in the housing and the container so that the supply of the solid blocks can be constantly determined visually and refilling can take place when appropriate.

The fluid jets may come from nozzles which are especially designed to provide an even beam of water. According to a simplified embodiment of the present invention, they may also come from a row of small holes in a horizontally arranged water conduit.

It was found to be especially advantageous if there are provided sufficient nozzles to impinge upon the solid block from four sides. The exposed surface area is then as large as possible so that an optimal dissolution rate can be obtained. According to this embodiment, the exposed surface area can be significantly larger than for dispensers of a known type wherein the block is sprayed upon from below.

Fig. 2 illustrates the container for the solid block. It is shown as a separate part, but it could also be rigidly connected to the housing 5. However, the embodiment wherein it is a separate part is preferred

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for purposes of servicing and maintenance.

Fig. 3 illustrates the housing surrounding the container, including the nozzles for the fluid jets 6, and the outlet 7 for the aqueous chemical solution. Under operating conditions, the solid block of chemical is sprayed upon by water from the nozzles and the solution formed flows from the block to outlet 7. From there, it is transported, via conduits, to the site of application, for instance a warewashing machine. The water is usually not continuously sprayed on to the block, but only during short periods of, for instance, 10 seconds. The dosing of the water is thereby controlled by a device which operates a valve in water conduits.

Although the dispenser of the present invention is especially suitable for obtaining solutions of a chemical from a solid block, it could also be used to obtain such solutions from a plurality of other discrete-shaped solids, e.g. smaller blocks, briquettes or tablets, provided that the openings in the lower part of the container 2, the water-permeable support, are properly adapted for such use. If the latter is provided as a water-permeable screen, even the use of powders can be envisaged.

Fig. 4 illustrates the operation of the dispenser according to the invention in obtaining a solution from a solid block of chemical. To that end, a conventional solid block prepared by crystallization according to Example 2 of EP-A-231,603 was placed inside the container 2. Subsequently it was sprayed upon in portions of 200 ml water, for 10 seconds, with intervals of 60 seconds.

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The water had a temperature of 20°C and was of 7° German Hardness. The concentration of the effluent was measured and is depicted as a function of the number of sprays. As can be seen from the Figure, the concentration in
5 the effluent was found to be essentially constant over a prolonged period.

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CLAIMS

1. A dispenser (1) for obtaining an aqueous chemical solution having a substantially constant concentration from a solid block of chemical, said dispenser comprising :

(a) a container (2) for holding and supporting the solid block (3), at least the lower part of which comprises a water-permeable support (4);

(b) a housing (5) surrounding the container for the solid block, said housing being openable at the top;

(c) substantially downwardly directed fluid jets (6) mounted inside the housing on at least two sides of the container (2) for the solid block (3), arranged to evenly shower the lower part of at least two opposed lateral surfaces of the solid block through the water-permeable support (4); and

(d) an outlet (7) in the bottom of the housing for the aqueous chemical solution formed upon spraying water on to said block.

2. A dispenser according to Claim 1, comprising a plurality of downwardly directed fluid jets arranged to impinge on to the solid block along a horizontal line.

3. A dispenser according to Claim 2, wherein the fluid jets impinge on to the solid block along the entire width of said block.

4. A dispenser according to Claim 3, wherein the fluid jets are provided to impinge upon the solid block from four sides.

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5. A dispenser according to any one of the preceding Claims, wherein the height of the container for holding and supporting the solid block is substantially larger than its width, such that two or more solid blocks may
5 be stored on top of each other.
6. A dispenser according to any one of the preceding Claims, wherein a transparent part is provided in the housing and the container for the solid block, such that
10 the supply of solid blocks can be determined visually.
7. Use of a dispenser according to Claims 1-6 in an industrial warewashing or fabric washing process.

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